

ON SEVERAL NEW RESULTS RELATED TO RICHARD'S INEQUALITY

CRISTIAN CONDE AND NICUȘOR MINCULETE*

Abstract. The main preoccupation of this article is the characterization of Richard's inequality, which is closely related to Buzano's inequality. Finally, we present a new approach for Richard's inequality, where we use the Selberg operator.

Mathematics subject classification (2020): 46C05, 26D15, 26D10.

Keywords and phrases: Inner product space, Cauchy–Schwarz inequality, Buzano's inequality, Richard's inequality, Ostrowski's inequality.

REFERENCES

- [1] J. M. ALDAZ, *Strengthened Cauchy-Schwarz and Hölder inequalities*, J. Inequal. Pure Appl. Math. **10**, 4 (2009).
- [2] N. ALTWAIJRY, C. CONDE, S. S. DRAGOMIR AND K. FEKI, *Some refinements of Selberg Inequality and related results*, Symmetry **15**, 8 (2023).
- [3] H. ALZER, *A Refinement of the Cauchy–Schwarz Inequality*, J. Math. Anal. Appl. **168**, 2 (1992), 596–604.
- [4] T. BOTTAZZI AND C. CONDE, *Generalized Buzano Inequality*, Filomat **37**, 27 (2023).
- [5] M. L. BUZANO, *Generalizzazione della disuguaglianza di Cauchy–Schwarz (Italian)*, Rend. Sem. Mat. Univ. e Politech. Torino **31**, (1974), 405–409.
- [6] A.-L. CAUCHY, *Cours d'Analyse de l'École Royale Polytechnique, 1 ère partie, Analyse Algébrique*, Reprinted by Ed. Jacques Gabay, Paris, 1989.
- [7] S. S. DRAGOMIR, *Some refinements of Schwartz inequality*, Simpozionul de Matematici și Aplicații, Timișoara, Romania, 1–2 (1985), 13–16.
- [8] S. S. DRAGOMIR, *Refinements of Buzano's and Kurepa's inequalities in inner product spaces*, FACTA UNIVERSITATIS (NIŠ) Ser. Math. Inform **20**, (2005), 65–73.
- [9] S. S. DRAGOMIR, *A potpourri of Schwarz related inequalities in inner product spaces (II)*, J. Inequal. Pure Appl. Math. **7**, 1 (2006).
- [10] S. S. DRAGOMIR AND A. C. GOȘA, *A generalisation of an Ostrowski inequality in inner product spaces, Inequality theory and applications*, vol. 4, Nova Sci. Publ., New York, 2007.
- [11] M. FUJII AND F. KUBO, *Buzano inequality and bounds for roots of algebraic equations*, Proc. Amer. Math. Soc. **117**, 2 (1993), 359–361.
- [12] I. GAVREA, *An extension of Buzano's inequality in inner product space*, Math. Inequal. Appl. **10**, 2 (2007), 281–285.
- [13] M. KHOSRAVI, R. DRNOVŠEK AND M. S. MOSLEHIAN, *A commutator approach to Buzano's inequality*, Filomat **26**, 4 (2012), 827–832.
- [14] C. LUPU AND D. SCHWARZ, *Another look at some new Cauchy-Schwarz type inner product inequalities*, Appl. Math. Comput. **231**, (2014), 463–477.
- [15] D. S. MITRINOVIĆ, J. PEČARIĆ AND A. M. FINK, *Classical and New Inequalities in Analysis*, Kluwer Academic Publishers, Dordrecht/Boston/London, 1993.
- [16] N. MINCULETE, *Considerations about the several inequalities in an inner product space*, J. Math. Ineq. **12**, 1 (2018), 155–161.
- [17] A. OSTROWSKI, *Vorlesungen über Differential und Integralrechnung*, vol. 2, Birkhauser, Basel, 1951.
- [18] J. PEČARIĆ AND R. RAJIĆ, *The Dunkl-Williams equality in pre-Hilbert \mathbb{C}^* -modules*, Lin. Algebra Appl. **425**, (2007), 16–25.

- [19] D. POPA AND I. RAŞA, *Inequalities involving the inner product*, J. Inequal. Pure Appl. Math. **8**, 3 (2007).
- [20] T. PRECUPANU, *On a generalisation of Cauchy–Buniakowski–Schwarz inequality*, Anal. St. Univ. “Al. I. Cuza” Iaşi **22**, 2 (1976), 173–175.
- [21] R. RICHARD, *Sur des in égalités du type Wirtinger et leurs application aux équationes différentielles ordinaires*, Colloquium of Anaysis held in Rio de Janeiro, 1972, pp. 233–244.